



EFFECT OF SOAKING AND GERMINATION ON MACRO AND MICRONUTRIENT CONTENTS OF TRIGONELLA FOENUM SEEDS

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ABSTRACT

Fenugreek seeds are rich in mucilaginous fiber and other dietary essentials, their use can be exploited as functional and nutritional foods as well as therapeutic agent. In this work the effects of soaking and germination on mineral composition like sodium, potassium, copper, iron, magnesium and zinc, of fenugreek seeds were examined. The above mentioned minerals were analyzed between dry, soaked and sprouted seeds of fenugreek. No significant increase was noted in the amount of sodium and potassium which increased slightly. Concentration of Cu was found highest in raw seeds followed by germinated seeds and lowest in soaked seeds. The concentration of iron was drastically increased in soaked and germinated fenugreek seeds as compared to raw seeds. The concentration of magnesium was observed highest in the fenugreek sprouts followed by raw seeds and lowest in soaked seeds but zinc content of fenugreek seed was found to be highest in (0.660 mg/kg) in raw seeds, followed by germinated seeds (0.658 mg/kg) and soaked seeds (0.583 mg/kg). It may be inferred from the present study that nutritional quality of fenugreek seeds can be improved through processing methods viz. soaking, germination.

KEY WORDS: fenugreek, raw seeds, soaked, germinated, macronutrients, micronutrients.

INTRODUCTION:

Fenugreek is regarded as the oldest known medicinal plant in recorded history. Its seed and leaves have medicinal value, and have been used to reduce blood sugar and lower blood cholesterol in humans and animals (Dahanukar et al., 2000). However, the seeds are bitter in taste due to the presence of bitter saponins, which limit their acceptability in foods (Sharma 1986; Udayasekhara et al., 1987). On the other hand, it has been possible to de-bitterize fenugreek seeds by employing various processing methods such as soaking, germination, roasting, etc. (Sharma, 1986; Shashi, 1997). As fenugreek seeds are rich in mucilaginous fiber and other dietary essentials, their use can be exploited as functional and nutritional foods as well as therapeutic agent. By keeping these facts in view various value-added baked and extruded products from wheat-fenugreek flour blends have been developed (Hooda and Jood 2003b). The overall objective of this study was to investigate the effects of processing methods on the mineral contents of fenugreek seeds in three different processing conditions i.e. raw grinded seeds, soaked seeds and germinated seeds.

MATERIAL AND METHODS:

Sample Collection and Preparation:

Approximate 500 gm of fenugreek seeds were purchased and brought to the laboratory from local grocery stores in the commercial city of Raipur.

Grinding:

The raw dried seeds were grounded in a laboratory mill to obtain fine flour and kept in air tight container until analysis.

Soaking:

The seeds were cleaned, graded, sorted and washed three times using potable water and were soaked in tap water for 12 hours at room temperature (30±2°C). At the end of soaking period, the soaked water was discarded and rinsed twice in tap water. The amount of soaked seeds were divided into two parts, one part was subjected to germination process and other part was subjected to drying in a drying oven at 60°C for 24 h and ground to pass through sieve to obtain fine powder.

Germination:

The soaked seeds were allowed to germinate under a wet muslin cloth for 48 hours. The germinated fenugreek seeds were dried in a drying oven at 60°C for 24 h and ground to pass through sieve to obtain fine powder.

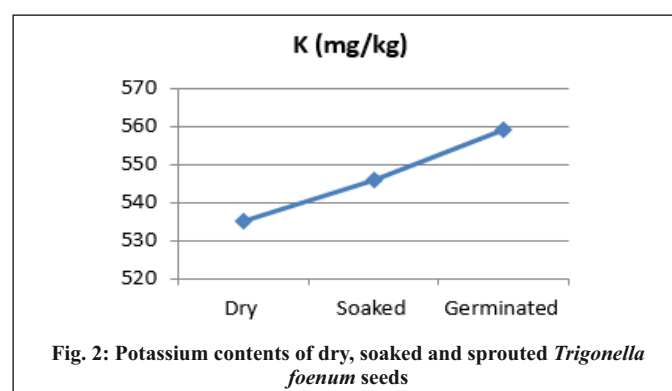
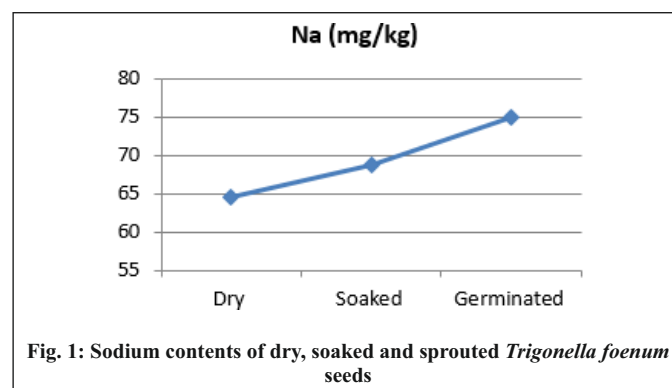
ANALYSIS:

Prior to analysis, the samples were digested with wet acid digestion method. Subsequently, samples were diluted up to 100 ml which was then filtered with whatman filter paper and ready for analysis using Atomic Absorption Spectrophotometer (AAS). Sodium and potassium were analyzed using Flame Photometer.

RESULT AND DISCUSSION:

The experiments are done in triplicate manner and results are expressed as graphical figures. No significant increase was noted in the amount of sodium and potassium which increased slightly.

Copper content: the amount of copper observed was 0.152 mg/kg in raw seeds, 0.120 mg/kg in soaked seeds and 0.149 mg/kg in germinated seeds. No significant increase was observed in the amount of Cu on soaking and sprouting process. But the results clearly show that fenugreek is an important dietary source of micronutrients copper. Cu is an essential micro-nutrient necessary for the hematologic and neurologic systems (Tan et al., 2006). Deficiency of copper is associated with some health complications such as heart failure and abnormal reproductive system. Copper is also important in the regulation of cholesterol biosynthesis (Lei et al., 2017).



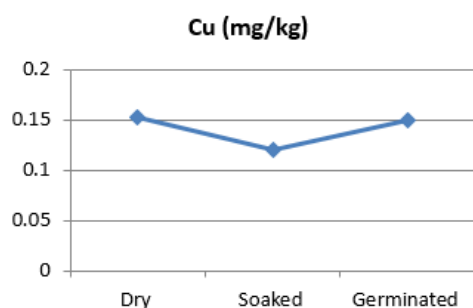


Fig. 3 Copper contents of dry, soaked and sprouted *Trigonella foenum* seeds

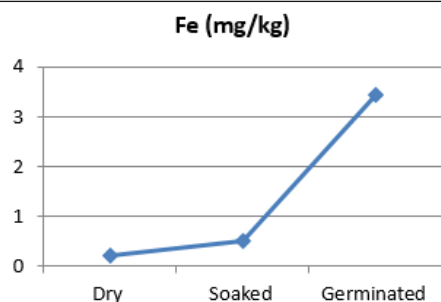


Fig. 4: Iron contents of dry, soaked and sprouted *Trigonella foenum* seeds

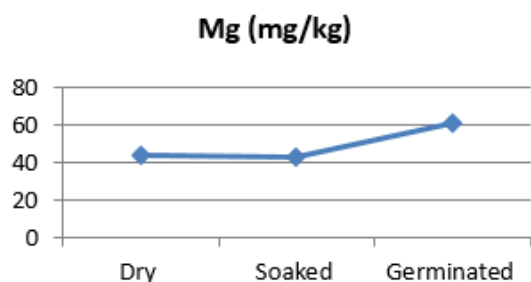


Fig. 5: Magnesium contents of dry, soaked and sprouted *Trigonella foenum* seeds

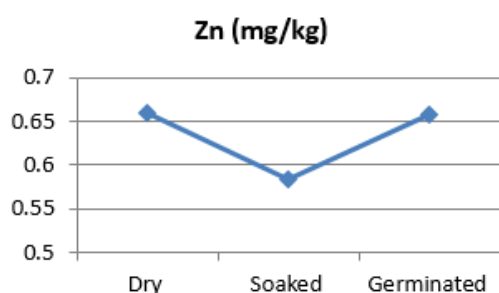


Fig. 6: Zinc contents of dry, soaked and sprouted *Trigonella foenum* seeds

Iron content:

Highest concentration of iron was found in germinated seeds (03.44 mg/kg) followed by soaked seeds (0.520 mg/kg) and raw seeds (0.216 mg/kg) respectively. Presence of iron in fenugreek seeds has also been reported by Doshi et al., 2012 and by Shakuntala et al., 2011 in seed endosperm of fenugreek. This clearly shows that fenugreek seeds may serve as an important source of iron supplementation and may help in combating dietary iron deficiency.

Magnesium content:

The concentration of magnesium was observed highest in the fenugreek sprouts i.e. 61.09 mg/kg followed by raw seeds (44.06 mg/kg) and lowest in soaked seeds i.e. 43.03 mg/kg. The Mg decreased at this time (soaking) might be due to increased requirement for nutrients by the growing plant metabolism Hefnawy (2011). The increase in magnesium content of sprouts is in accordance with the research of Hooda and Jood, (2003). But the results are lower than 720.5 mg/kg

that of reported by Hooda and Jood (2003a), 1550.9 & 1730 mg/kg (EHNRI, 1997), and 1600 mg/kg (Srinivasan, 2006).

Zinc content:

Zinc content of fenugreek seed was found to be 0.660 mg/kg in raw seeds, 0.583 mg/kg in soaked seeds and 0.658 mg/kg in germinated seeds. Other study reported zinc content of fenugreek seed to be within the range of $25.4 \pm .02 \mu\text{g/gm}$ to $68.05 \pm .02 \mu\text{g/gm}$ (Pathak and Agrawal 2014). Comparatively lower contents of minerals when soaked in water might be due to leaching out of some minerals into the soaking water (Nolan and Duffin 1987; Jood and Kapoor 1997).

Decreases in Na and K content as compared to raw materials are in accordance to the results of Amany et al (2014). The trend observed was consistent to the results of Hooda and Jood (2003) who suggested that soaking of fenugreek resulted in a decrease in total Ca, Fe and Zn but germination caused an increase in its contents relative to the raw material. In accordance with the research of Tamiru et al (2012) during 48 h germination time Fe, Ca and Zn contents increased significantly as compared to the raw fenugreek seeds.

CONCLUSION:

Present investigation explicated the potential of germination for the preparation of fenugreek flour with better nutritional and functional properties. The study showed that 72h of germination of fenugreek flour proved to be the best for highest nutrient content.

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